INTRODUCTION

- **Target:**
  Provide a visual guide of the different steps required to use an I3 Metal Motion 3D printer.

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- **Photographic credits:**
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- **Sources:**
  http://reprap.org/wiki/RepRap
  http://www.repetier.com/

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- **Update:**
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- **Useful links:**
  You can find additional information on the following sites :
  Repetier-Host software website : http://www.repetier.com/
  3D file database : http://www.thingiverse.com/
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SOFTWARE INSTALLATION
Installation of the softwares on Windows

Target: install the needed softwares for the use of the I3 Metal Motion on Windows OS all versions included.

Warning: be sure to disable your antivirus and firewall before installing the software in order to don't block the installation of the drivers.

You will need to download:
- The drivers of the electronic eMotronic board
- The latest version of Repetier-Host

Pre-requisite:
- Up-to-date DirectX Drivers
- .net framework 4.5 or higher

WARNING: eMotronic board should be unplugged from the computer.

1°) Run the installer file (.exe) and follow the instructions.

2°) At the step of «Components selection», be sure to uncheck «Repetier-Server».
1°) Get the drivers installation file for the eMotronic board on our website (reprap-france.com), in the «support» section, in the «All files» sub-section, then in the «I3 Metal Motion / Software / Windows / eMotronic Driver.exe»

2°) Install the drivers of the eMotronic board by executing the downloaded file (double-click) and then follow the instructions.

3°) Connect the I3 Metal motion to your computer using the USB cable. Your device should be automatically recognized.

Note : if drivers installation fails, continue installing the software. You can then assign the drivers to the board via the Device Manager (drivers are downloadable from our website / Support / Drivers).
Software installation on Linux

**Target**: install the necessary software to use the I3 Metal Motion on a Linux based operating system computer.

(Installation tested on Ubuntu 16.04 LTS and Mint based Debian)

**You will need to download**:
- The latest version of Repetier-Host
- The CuraEngine slic3r profiles dedicated to the I3 Metal Motion

**Pre-requisites**:
- Graphics modules installed
- OpenGL installed

1°) Download the «repetierHostLinux.tgz» file (to be downloaded from our website’s «Support» section, «I3 Metal Motion / Software / Linux»)

2°) Decompress it with the following command «tar xzvf repetierHostLinux.tgz».

3°) Access the folder with the command «cd RepetierHost/».

4°) Use command «sh configureFirst.sh» to install Repetier-Host.

5°) Run Repetier-Host with «./RepetierHost» command.
Setting up of the firmware

Target: copy the firmware's files in the TF card.

1°) Visit our website (www.emotion-tech.com), in the «Support» section, in the «I3 Metal Motion / Software / Firmware /» folder, and download the firmware compressed folder for this 3D printer.

2°) Unzip this folder and copy/paste its content to the root of the eMotronic's TF card.

Note: TF card is usually detected automatically and its content displayed once you connect your 3D printer to you computer. The TF card generally appears as drive «E:» or «F:» but it can vary depending on your hardware.

3°) Press the «Reset» button on the 3D printer (located on a side of the lower plate).
4°) Check in the device manager that the eMotronic is properly recognized.

**Windows : Device Manager**

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**Attributed COM port number : COM5**

**With Linux : command line from a terminal**

Use the following command : lsusb

```
rockebv-rocky ~ $ lsusb
Bus 001 Device 007: ID 1d50:6615 OpenMoko, Inc.

Bus 001 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
```

The eMotronic board will appear as «OpenMoko, Inc».

Take note of the communication port attributed to your printer

Make sure that a USB port is attributed to the board using the following command : ls /dev/tty

```
rockebv-rocky ~ $ ls /dev/tty
tty9  tty21  tty35  tty49  tty62  tty76  tty80
tty22  tty36  tty48  tty51  tty63  tty77  tty81
tty23  tty37  tty50  tty52  tty64  tty78  tty82
tty24  tty38  tty51  tty53  tty65  tty79  tty83
tty25  tty39  tty52  tty54  tty66  tty80  tty84
tty26  tty40  tty53  tty55  tty67  tty81  tty85
tty27  tty41  tty54  tty56  tty68  tty82  tty86
tty28  tty42  tty55  tty57  tty69  tty83  tty87
tty29  tty43  tty56  tty58  tty70  tty84  tty88
tty30  tty44  tty57  tty59  tty71  tty85  tty89
tty31  tty45  tty58  tty60  tty72  tty86  tty90
tty32  tty46  tty59  tty61  tty73  tty87  tty91
tty33  tty47  tty60  tty62  tty74  tty88  tty92
tty34  tty48  tty61  tty63  tty75  tty89  tty93
```

Usually, the port assigned to the port is «ttyACM0», «ttyACM1» «ttyUSB0» or «ttyUSB1».
Connecting your printer to Repetier-Host

1°) Run Repetier-Host software.

2°) Go to «Config» then «Printer Settings».

3°) Select the COM port assigned to your I3 Metal Motion.

On Windows

On Linux

Select the COM port assigned to your machine

Write the COM port assigned to your machine
Setting the shape of the 3D printer

1°) Still in the 3d printer setting panel, go to the «Printer Shape» tab

2°) Fill in the different boxes as indicated below

![Printer Settings](image)

The min and max values define the possible range of extruder coordinates. These coordinates can be negative and outside the print bed. Bed left/front define the coordinates where the print bed itself starts. By changing the min/max values you can even move the origin in the center of the print bed, if supported by firmware.
1°) Download the slicing profiles for the I3 Metal Motion on our website, in the dedicated tree of the support section.

2°) Import these profiles into Repetier-Host by going to the «Slicer» tab, then clicking on the «Configuration» button and finally «Import».

3°) Select the print profile (.RCP) to import into the software in the «Printing» tab.

4°) And finally, import the 3 slicing profiles for the filament types (.RCF) in the «Filament» tab.
PREPARATION

Connection to Repetier-Host

1°) Click on the «Connect» button.

2°) Check that the extruder’s temperature is consistent (logical value) and the printer’s status is «Idle» as shown below:

This one should change color, become blue when connected
Motion test

Press the X axis homing button and check that the X carriage stops after having engaged its limit switch on the right. In case of problem do not hesitate to press the «Reset» button.

Do the same for the Y axis (heating plate), which has its sensor at the front of the machine and finally for the Z axis which has its sensor at the top.

⚠️ Keep a finger close to the reset button if something goes wrong.
PREPARATION

CALIBRATION

1°) Press the button on the screen to access the main menu (a «beep» is emitted).

2°) Turn the knob until the cursor is in front of «Calibration», then press the button («bip» emitted).

3°) Place the cursor on «Calibrate», then press the button of the screen («bip» emitted).

Press = selection
Rotation = cursor’s movement
Screen’s button

Back..
Initialisation
Print
Jog
Calibrate

Back..
> Calibrate

Fix the probe then click.
4°) Attach the calibrating probe to the extrusion block as shown below.

5°) Then plug the probe connector into the center socket of the electronic board as shown below.
PREPARATION

Press the button on the screen («beep» emitted).

7°) When the probe button is pressed, the calibration of the plate will start.

The board will be probed on 7 points per line.

8°) When the probing of the various points is finished, the screen will indicate it to you through the message below:

Congratulations! Calibration is successful.
1°) **For height calibration**, make sure that the calibration sensor is removed from the extrusion block and is no longer connected to the electronic board.

2°) Place a sheet a paper in the center of the tray and press the button of the screen («beep» emitted).
3°) Move the Z axis so that the sheet of paper is a little wedged between the nozzle and the plate.

4°) First, move the nozzle near to the plate with increments of 1 mm by placing the cursor on «Move Z 1.0mm» and pressing the button («beep»).

5°) Once the adjustment with 1 mm increments is done, go back by choosing the option «..Back» and make the adjustment in steps of 0.05 mm in the same way as described above.
6°) Once the sheet of paper has been squeezed between the nozzle and the tray, go back by choosing the «..Back» option and select the «Save and Quit» option to finalize the height calibration.

- Move Z to let the nozzle touch the paper
  - Move Z 1.0mm
  - Move Z 0.05mm
  > Save and quit
Checking the fans

Your extruder has two fans. The top one cools down the cold end of the print head and should turn on as soon as you plug in your machine. The blower fan with a fan duct, lower, has the role of cooling the part being printed.

It can be started using the manual control (as illustrated below) and when printing, it will start automatically.

![Activation of the blower fan](image)

Click on the icon to activate the blower fan and check that it is working properly.
PREPARATION

Checking the heating parts

Start heating the print head by clicking on the icon circled in red:

Extruder
Do not put filament in your extruder and check that your extruder motor is rotating in the right direction. For this, extrude 10 mm using the manual controls:

Note: the temperature of the extruder will increase gradually until reaching the target temperature (here 200°C).
**PREPARATION**

**Loading the consumable**

1°) Cut in bevel the end of the filament in the winding direction of the spool.

2°) Disengage the extruder by pressing the knurled screw

3°) Pass the filament through the extruder inlet and push it as far as possible.

4°) Tighten the filament pressure knob (Note: if the knob is not tight enough, the filament will be poorly trained) (less pressure for ABS)
Extrusion test

1°) In the «Manual Control» tab, request a slow extrusion of 50 mm.

2°) Check that the filament is coming out of the nozzle on a regular basis.

If you find that this is not the case, repeat the procedure from the beginning by removing the filament, cutting it in bevel, etc.
PRINTING
Print the spool holder

You are about to start your first print. This will consist in printing the spool holder that will be mounted on the right side of the i3 Metal Motion.

Visual of the spool holder:

1°) Go to the LCD main menu by pressing the LCD push-button and select the «Print» option.
2°) Select the «spool_holder.gcode» file, then press the button on the screen to start printing.

The printing then begins with a homing of the axes and then heating the print head.
CONGRATULATIONS!
Your first print was successful!

Go to the «Appendix» section to find explanations concerning the mounting of the spool holder.
Installation of the spool holder

**Target**: install the spool holder on the right side of the printer

Install the PTFE tube between the spool holder and the extrusion block
**Automatic calibration by command line**

If for some reason you need to perform the calibration without going through the LCD, you can perform this process using GCODE commands to send to the machine, here's how to do this.

**Adjusting the flatness**

1°) Make sure the print head is at room temperature.

2 °) Mount the probe on the extrusion block of the machine and connect it to the electronic board.

3 °) Go to the «Manual control» tab and ask for homing on all the axes using the «G28» command.

5 °) Send the «G31» GCODE command (the multi-point probing will start).

6 °) Once the probing is done, save the new values by sending the «M374» GCODE command.

7 °) Remove the sensor from the extrusion block, unplug it from the board and place a sheet of paper in the center of the plate.
Initial setting of the maximum height

8 °) From the tab «Manual control», ask a reference of origin.

9 °) Place a sheet of paper in the center of the plate.

10 °) Start a heating of the print head and wait until reaching 70 ° C minimum.

11 °) Using the cursor dedicated to the Z axis, go down until the nozzle holds the sheet of paper slightly.

12 °) Send the «M306 Z0» GCODE command to indicate the maximum height of your machine.

13 °) Save the new value with the «M500» GCODE.
Printing a 3D model

Prerequisites: have performed a complete calibration of the machine.

1 °) Download a 3D model, we offer the eMotion Tech keychain:
https://data.emotion-tech.com/ftp/Ressources_3D_eMotion_Tech/Porte_clef_eMotion-Tech.stl

2 °) Import this 3D model into Repetier-Host:

- in the tab «Object placement», click on the button «Add object»
- select the downloaded file and open it with Repetier-Host
2) Modify the object according to your preferences:

- in the tab «Placement of objects», click on the button «Add object».

3) Slice the model with CuraEngine pre-selections:

- in the «Slicer» tab, select «CuraEngine».

Then, click on «Slice with CuraEngine»
4°) Once the file is sliced, its preview is displayed and all that remains is to click on the «Print» button.
**PID calculation**

**Preamble**: The PID values are necessary for the temperature control of the heating elements. If you find that the target temperature is difficult to reach or the actual temperature varies a lot around the target temperature, it may be useful to recalculate the PID values.

**By GCODE commands**:

1°) Make sure the print head temperature is at room temperature.

2°) Disable the secondary fans.

3°) In the «Manual control» tab, use the input field for sending GCODE commands:

Send the following command: **M303 E0 S250 C8**

**Details**:

- **E0** = extruder number 1
- **S250** = target temperature at 250°C
- **C8** = 8 cycles of regulations around the target temperature

Once the command is sent, Repetier-Host logs will show you the progress of the calculation. When the calculation is finished, the new values P, I and D are indicated in the logs.

4°) Send the following GCODE command to save: **M500**

---

**If you have the LCD screen**:

In the menu of the screen is integrated an option to directly calculate the PID.

Just go to the «Calibrate / PID hotend» menu.
Maintenance

A monthly maintenance of the 3D printer is recommended.

Below are some recommendations:

Using a brush, dedust the following elements:
- eMotronic board
- All fans to ensure a good airflow
- Cold part of the printhead

- To clean the printhead follow the guide dedicated to the Hexagon hotend on the following link:

- Clean the teeth of the drive wheel using a sharp ended tool like a needle tip, the end of tweezers or a cutter blade.

- Check & tighten the screws of the 3D printer.

- Lubricate the various mechanical transmission elements with multipurpose grease.

Recommandations

Turning off your 3D printer:
After printing, if you want to turn off the machine, wait until the print head cools down to room temperature to ensure that the print head doesn't get clogged.

Transport:
If the printer has to be transported by car or another mean of transport in which it could be subject to vibration, it is recommended to unplug all the motors from the eMotronic board to avoid damaging it and calibrate again your printer before printing.

Troubleshooting:
A FAQ about the I3 Metal Motion is available on our website in the «Support» section, please refer to it to troubleshoot your printer, most problems could be solved through this tool!
APPENDIX

Restore the TF card

**Target**: prepare the files of the TF card again in order to eliminate the corrupted files and defective cells.

**Description**: for various reasons, the files present in the TF card and/or the cells of this card can be damaged. You will find through this process how to restore the TF card and necessaries files to the 3d printer.

1°) **Remove the TF card by pressing it, you will hear a click indicating that the card is no longer locked and can be removed without damage the reader.**

2°) Then read this TF card with an external drive on your computer (very useful because the formatting is too long by USB cable).

3°) Make a long format (uncheck the «fast format» box) of the TF card in FAT format (FAT16: < 2 GB / FAT32: > 2 GB)
4°) Download the latest firmware on our website «reprap-3d-printer.com» in the support section, in the tree dedicated to your machine.

5°) Unzip the newly downloaded folder (right click on the compressed folder and then «Extract everything ...»).

6°) Go inside this folder, then select all the files and finally copy them to the root of the TF card.
7°) Eject the TF card (right click on the TF card then «Eject»).

8°) Disconnect the TF card reader from the computer.

9°) Insert the TF card into the eMotronic drive.

10°) Press the «Reset» button (the red one) located on the 3D printer to let the board uses the new firmware.

11°) In the TF card, make sure that the «firmware.bin» file is changed to «firmware.cur».

12°) On the eMotronic board, between the USB connector and the auto-leveling sensor connector, make sure that:
- LED1 remains on
- LED2 and LED3 flash continuously
- LED4 remains on
From there, the eMotronic card should be recognized by the Device Manager and the contents of the TF card should be displayed in the Files Explorer. It will then only remain to realize again the calibration of the 3D printer.
Installing Repetier-Host Software on Mac OS X

1°) Download the «Repetier-Host.dmg» installation package from our website (www.reprap-france.com), in the «Support» section, in the sub-section named «All files», then «I3 Metal Motion / Software / Mac /».

2°) Then install this software in the same way as any other Mac.

3°) Finally launch the Repetier-Host software.
Configuring the 3D Printer Connection Settings on Repetier-Host Mac OS X Version

1°) Click the 3-gear icon in the top right corner of Repetier-Host («Printer Settings»).

2°) Fill in the different fields as shown below.

Is likely to change but must match the machine's electronic board
Configuring 3D Printer Dimension Settings on Repetier-Host Mac OS X Version

1°) Go to the «Dimension» tab and fill in the fields as shown below.
Configuring Slicing Settings for «Slic3r» Mac OS X Version

1°) Go to the «Slicer» tab and press the «Configuration» button.

2°) Fill in the different fields as indicated below.
**Filament Settings**

**Color:**

**Diameter:** 1.75 mm

**Extrusion multiplier:** 1

**Temperature (°C):**

**Extruder:**
- First layer: 210
- Other layers: 200

**Bed:**
- First layer: 65
- Other layers: 55

**Fan settings:**
- Fan speed: Min: 80, Max: 100
- Bridges fan speed: 100
- Disable fan for the first: 3 layers

**Cooling thresholds:**
- Enable fan if layer print time is below: 60 s
- Slow down if layer print time is below: 15 s
- Min print speed: 10 mm/s

Enable auto cooling:
If estimated layer time is below ~15s, fan will run at 100% and print speed will be reduced so that no less than 15s are spent on that layer (however, speed will never be reduced below 10mm/s). If estimated layer time is greater, but still below ~60s, fan will run at a proportionally decreasing speed between 100% and 60%. During the other layers, fan will be turned off.
Printer Settings

Size and coordinates

Bed shape: Set...
Z offset: 0 mm

Capabilities
Extruders: 1

OctoPrint upload
Host or IP: 
API Key: 

Firmware
G-code flavor: RepRap (Marlin/Sprinter/Repetier)

Advanced
Use relative E distances: 0
Use firmware retraction: 0
Use volumetric E: 0
Pressure advance: 0
Vibration limit (deprecated): 0 Hz

Start G-code
G0 ; home all axes
G1 Z30 F5000 ; lift nozzle

End G-code
M104 S0 ; turn off temperature
G28 ; home X axis
M84 ; disable motors

Before layer change G-code

After layer change G-code

1.2.9 - Remember to check for updates at http://slic3r.org/
Ok, now your software is well setted and your I3 Metal Motion is ready to print!
Thank you for choosing the I3 Metal Motion!

www.emotion-tech.com